THE UNIVERSITY OF MELBOURNE

Faculty of Science

ALUMNI & FRIENDS 2017
School of Mathematics & Statistics

Alumni Newsletter of the School of Mathematics & Statistics
Bringing Past Students Together

A Message from the Head of School

This first year of my term as Head of School has been a busy and exciting one. The School continues its growth trajectory and is increasing its research impact as well as enhancing its already strong international profile. Areas that have seen significant development this year have been data science, statistics and pure mathematics.

We have done very well in attracting three new senior staff members: Professor Howard Bondell from North Carolina (Data Science), Professor Stavros Garoufalidis from Georgia Tech (Pure Mathematics) and ARC Laureate Professor Kate Smith-Miles from Monash (Operations Research). Kate is currently also President of the Australian Mathematical Society.

We have continued to improve gender balance by advertising new female only continuing positions in both data science as well as pure mathematics. The School has received national acclaim for this bold initiative of my predecessor, and as I write this I am thrilled that we have just been able to secure the new young promising data scientist Susan Wei from Minnesota on a regular position, which is a clear sign that we are on the right track. The School furthermore continues to support AMSI's Choose Maths campaign to increase female participation in mathematics and statistics in primary and secondary schools.

This year has also seen the retirement of Emeritus Professor Anthony J. Guttmann. Tony has been incredibly important for our School and leaves a long lasting legacy. Directorships of the Australian Mathematical Sciences Institute (AMSI) and the ARC Centre of Excellence for Mathematics and Statistics of Complex Systems are just two of his major achievements. Tony remains active, in particular as organiser of the new Simon Marais mathematics competition. It is a clear sign of the strength of our student cohort that the University of Melbourne was by far the best performing Australian university and came second in the 2017 edition of this highly competitive international competition.

The School hosted two festive alumni events this year. The annual Student Awards ceremony was very well attended and we also hosted a room naming ceremony, honouring past staff members by naming the Kerry Landman room, the Colin Thompson Laboratory and the Greg Hjorth seminar room. I was particularly grateful for the presence of the Hjorth family.

The School saw two major reviews in 2017, one of the School itself by an external panel and by the ARC of the ARC Centre of Excellence for Mathematical and Statistical Frontiers (ACEMS) of which the School is the leading node. Both reviews went very well, and while we are still awaiting the official review reports, initial feedback has been extremely positive.

All in all it was an extremely successful year for the School and I am looking forward to a continuation of that success in 2018!

Professor Jan de Gier
Head of School

Visit the alumni website for news, benefits, offers, volunteering opportunities, and to update your alumni details
alumni.unimelb.edu.au

Promotions and Prizes

Staff continued to be recognised for their excellence through prizes and promotions in 2017.

Associate Professor James McCaw has been promoted to Professor, Dr Guoqi Qian has been promoted to Associated Professor, and Drs Alysson Costa, James Osborne, Charl Ras, Lawrence Reeves, David Ridout and Nathan Ross have been promoted to Senior Lecturer.

Professor Aurore Delaigle received the prestigious international *George W. Snedecor Award* from the Committee of Presidents of Statistical Societies in August.

Peter Taylor (Director of ACEMS) has been awarded the title of *Redmond Barry Distinguished Professor* for outstanding teaching and leadership – the first from the School of Mathematics and Statistics.

Tony Guttmann and Hyam Rubinstein have both been awarded an *Emeritus Professorship*. Emeritus status is highly eminent and only awarded to distinguished Professors who have made significant contributions to the University.

Rosie Pingatore was awarded the *University's 25 Years Medal*, for her distinguished service as a professional staff member in the School of Dentistry for 22 years and in the School of Mathematics and Statistics for the last 3 years.

Two staff were also awarded Dean's Awards in 2017. Dr Nathan Ross received the *Dean's Award for Excellence in Research (Teaching and Research)* for his research work at the interface of probability and statistics. Professor Konstantin Borovkov received the *Dean's Award for Excellence in RHD Supervision* for providing an environment for his PhD students to flourish and excel by fostering a culture of curiosity and scholarship.

Professor Aurore Delaigle wins Snedecor Award

The Committee of Presidents of Statistical Societies (COPSS) honoured Aurore Delaigle with one of its top awards, the George W. Snedecor Award.

The award honours biennially a researcher who is instrumental in the development of statistical theory and analysis involving biological data.

In this case, it was for a publication Aurore co-wrote with Professor Peter Hall, who passed away in early 2016. It was entitled, "Nonparametric methods for group testing data, taking dilution into account," and appeared in Biometrika in 2015.

Aurore's research centred around pooled laboratory samples, where the fluids (blood or urine) from a group of are combined, and a single test is performed on the pooled fluid. This may be done because there isn't enough money to perform tests on each individual or there isn't enough time. By combining the samples, a positive sample, of say a disease, could be diluted by the rest of the samples which might be negative. Aurore's research takes this dilution effect into account, and constructs, using the grouped data, a nonparametric estimator of the probability of someone having the disease.

Aurore is a Professor and ARC Future Fellow in the School. She has been an ACEMS Chief Investigator since 2014.

New Professor James McCaw

James McCaw received his BSc(Hons) (2000) and PhD (2004) both from the University of Melbourne in the field of theoretical physics. He was appointed as a research fellow in 2005 in the Melbourne School of Population and Global Health, where he transferred his skills to the domain of infectious diseases modelling and epidemiology. Through 2015 he was appointed in a research only capacity, including award of an Australian Research Council Future Fellowship (2011–15). In 2015 he took up a Teaching and Research position cross-appointed between the School of Mathematics and Statistics and the Melbourne School of Population and Global Health, recently being promoted to Professor.

James' research lies at the interface between mathematics, biology and epidemiology. His research currently focuses on the host-pathogen interaction, the development of mathematical models of the immune response and its influence on infection. This research extends to the mathematical study of novel drug candidates and how they may help resolve infection. At the epidemiological scale, James has been a major contributor to the development of Australia's response planning for public health emergencies such as pandemic influenza and Ebola.

He has been a chief investigator on multiple ARC Discovery and Linkage grants and NHMRC Project grants. He is currently a chief investigator on two NHMRC Centres of Research Excellence, one in infectious diseases modelling for public health policy and the other in malaria elimination. James' applied research has been supported by the Australian Government Department of Health, Defence Science Technology Group and most recently the United States Department of Defence.

James' research has been recognised through several national awards, including the 2016 Eureka Prize for Infectious Diseases Research and a 2012 Young Tall Poppy Science Award (Victoria). His research has international links with collaborators in the United Kingdom (Oxford, Imperial and Warwick), Thailand (Mahidol) and Canada (York).

In teaching and leadership, James has played a leading role in the development and delivery of new curriculum in the field of computational biology. He is the coordinator for both the Undergraduate Major (Bachelor of Science) in Computational Biology (launched 2016) and the Masters in Computational Biology (to launch in 2018).

Image: Aurore Delaigle with Nicholas Horton and Paul Rathouz (photo courtesy of the American Statistical Association)

Staff Retirements

We profile four staff who are retiring at the end of 2017 and start of 2018: Professors Tony Guttmann (December 2017), Richard Huggins (January 2018) and Paul Pearce (February 2018), and Ms Sharon Gunn (January 2018).

Professor Tony Guttmann

Image: Tony with his grandson Theo

Professor Anthony (Tony) John Guttmann, FAA, FTSE, FSIAM, FAustMS, was born in Melbourne in 1945, to Hungarian immigrant parents. He received his BSc and MSc degrees in Physics at the University of Melbourne in 1965 and 1967, and his PhD in Mathematics at the University of New South Wales in 1969. Following a postdoctoral appointment at King's College, London, he returned to Australia in 1971 as a Lecturer in Mathematics, at the University of Newcastle, where he became Professor of Mathematics in 1984.

In 1987, Tony returned to the University of Melbourne as a Reader in Mathematics, then Professor of Mathematics (Personal Chair) in 1988, where under his effective leadership, the mathematical physics group grew to become one of the largest and strongest groups in mathematical physics in the world.

Tony's research is in mathematical studies of critical phenomena, with emphasis on numerical and combinatorial problems that arise in modelling phase transitions. He wrote more than 280 papers and three books, played key roles in the establishment of the Australian Mathematical Sciences Institute, AMSI (2001), the Centre of Excellence of Mathematics and Statistics of Complex Systems, MASCOS (2003), and the Centre of Excellence in the Mathematical Sciences, ACEMS (2014), and has run a state-wide school mathematics competition for 30 years.

Tony is the recipient of the Medal of the Australian Mathematical Sciences Institute (2012), the Lyle Medal of the Australian Academy of Science (2005), the B. H. Neumann Award for Services to Education (2004), the Centenary Medal by the Australian Government (2003), and the Hannan Medal of the Australian Academy of Science (1999). He is Life Fellow of the Australian Mathematical Society (2012), Fellow of the Society for Industrial and Applied Mathematics (2009), the Australian Academy of Technological Sciences and Engineering (2007), and the Australian Academy of Science (2002).

Tony has made outstanding contributions to the mathematical sciences in Australia and worldwide, as a scholar and a teacher, as a leader and a highly esteemed colleague. He will continue his research and student supervision, in the School of Mathematics and Statistics, as a Professor Emeritus.

Professor Richard Huggins

Professor Richard Mark Huggins retires after 34 years as an academic statistician. Richard obtained a BSc (Honours) degree and a PhD degree, both in Statistics and from La Trobe University, in 1977 and 1983 respectively. Richard's PhD was supervised by David John Scott.

After a brief stint at The University of Melbourne and Texas A&M University as a postdoctoral fellow, Richard was appointed as a lecturer at La Trobe University in 1985. He was promoted to Associate Professor and Reader there in 1996, and then went to the Australian National University as a visiting professor in 2004. Richard was appointed as Professor and Chair of Statistics in the Department of Mathematics and Statistics at the University of Melbourne in 2005.

Richard's main research areas are statistical inference for stochastic processes, robust statistics, capture-recapture modelling and data analysis in ecological and environmental research, and statistical analysis for genetic dynamic mutations.

Richard has published over 150 research papers with over 2160 citations. He has regularly received ARC DP and Linkage, and NHMRC project grants. He served as an associate editor for Biometrics and Australia & New Zealand Journal of Statistics.

Richard has provided critical leadership to the School of Mathematics and Statistics in developing its new undergraduate and postgraduate statistics programs under the Melbourne Model. He not only offered his insightful vision during their development but also committed many of his working hours to meeting with colleagues and writing up curriculum programs.

Outside working time, Richard enjoys staying with his family, motorcycle riding, dog walking and fishing.

Professor Paul Pearce

Professor Paul Anthony Pearce was born in 1951, in London, UK. He received his BSc (Hons) and PhD in Mathematics in the University of Melbourne in 1974 and 1977. Following postdoctoral appointments at Carnegie-Mellon University, the Institute for Advanced Study, Princeton, and the Australian National University, Canberra, he returned to the University of Melbourne as a Lecturer in Mathematics in 1985, and a Professor since 2010.

Paul's research is in statistical mechanics and conformal field theory, where his contributions have strongly influenced the development of these disciplines. These contributions include studies of the real space renormalization group, exact solutions of 2D classical/1D quantum systems via functional equations and non-linear integral equations, the classification of rational boundary conformal field theories, and the integrable lattice approach to logarithmic conformal field theories. He received the Royal Society of Victoria Research Medal in 1995.

Paul is a member (and past chair) of the Board of Trustees of the Asia Pacific Center for Theoretical Physics (APCTP) in Seoul since 2007, where he has been active as a conference and workshop organiser. His services to the mathematical physics community include membership of the International Union for Pure and Applied Physics, and the editorial boards of the Journal of Statistical Mechanics: Theory and Experiment, Advances in Mathematical

Physics and the Journal of Statistical Physics.

Paul has steered 12 large ARC projects to successful completion, supervised 11 Research Fellows and 7 PhD students many of whom have gone on to successful careers. He retires at the end of February 2018, after 32 years in the University of Melbourne, but will continue to play an active role in the School of Mathematics and Statistics.

Sharon Gunn

Sharon Gunn graduated with a Bachelor Science at the University of Melbourne in 1974. She undertook research in statistics education at the University of Waikato, New Zealand with Andy Begg. She also taught statistics and numeracy skills to indigenous students in Melbourne.

Sharon came to the Department of Mathematics and Statistics in 2000 as a tutor in statistics, three years after the School was formed by the amalgamation of the existing departments of mathematics and statistics.

In her early years, she took over a large proportion of the Department's service teaching of first year statistics and later year applied statistics subjects. She later moved on to the development and improvement of a number of the Department's statistics subjects. In particular, she worked closely with Associate Professor Ray Watson on the statistics subjects taught for the University's medical students.

More recently, her tireless efforts have made the first year level statistics subject Data Analysis 1 a very popular and successful introduction to applied statistics for science and non-science students alike.

Throughout her time in Mathematics and Statistics, Sharon maintained a lively interest in pedagogical issues relevant to the teaching of statistics. She has published a number of articles on these topics and has always strived to apply best practice in this area in her own teaching. Her dedication to practice and high ideals in teaching will be greatly missed, but her wide range of life interests will undoubtedly keep her very active and productive in retirement.

Room Naming Event

On Thursday 24th August, the School of Mathematics and Statistics held a reception to officially name three rooms in the Peter Hall building after distinguished Professors from the School. The rooms are known as the Kerry Landman Room (meeting room), Thompson Laboratory (computer lab), and the Greg Hjorth Seminar Room.

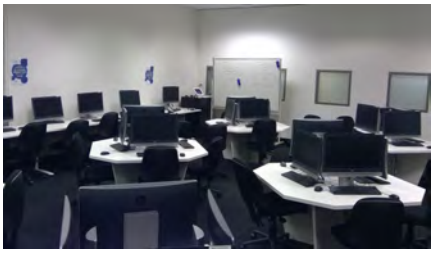

Image: Thompson Computer Lab

Colin John Thompson was appointed to a chair in mathematics at the University of Melbourne in 1972, following a highly successful decade of research and scholarship in mathematics and mathematical physics. He continued as a leading authority in statistical mechanics, and wrote two outstanding sole-author texts and many seminal papers.

He was elected as a Fellow of the Australian Academy of Science in 1995 and served as Head of the Department of Mathematics from 1977 to 1979 and again from 1986 to 1989.

Although retired for over 18 years, Emeritus Professor Thompson has remained a prolific researcher, including among his diverse interest a particular focus on ecological problems.

Image: Colin Thompson

Professor Kerry Landman, who retired in 2015, was appointed as a lecturer at the University of Melbourne in 1986. In 2007, Kerry became the first female professor in the mathematical sciences at the University of Melbourne.

She made profound contributions to the mathematical sciences locally, nationally and internationally over 30 years. She directed a number of national Mathematics in Industry Study Groups and was a trail-blazer for industrial mathematical consulting.

She established the discipline of mathematical biology at the University of Melbourne and had notable collaborations with biologists and medical scientists, especially on problems of normal and anomalous embryonic growth and development.

Image: Kerry Landman

Professor Greg Hjorth (1963–2011) was a University of Melbourne undergraduate who returned to the University of Melbourne as an Australian Professorial Fellow in 2006, after an outstanding career in the United States, where he retained links through a concurrent appointment at UCLA.

His untimely death at age 47, took from the Australian mathematical sciences community one of its brightest stars. A major international figure in mathematical logic, Greg Hjorth exemplified the highest traditions of scholarship and academic integrity.

As a young man, he was also one of Australia's finest chess players, becoming joint Commonwealth Champion in 1983 and earning the title of International Master in 1984.

Image: Greg Hjorth

Dr Jim Cross Obituary

James (Jim) Cross was born in Melbourne in 1937 and sadly passed away in January 2017. He was both an alumnus and a staff member of the University of Melbourne.

Jim spent five years in the novitiate of a Catholic religious order, the Franciscans. Impressed by Jim's brilliance in logic and mathematics, his superiors counselled him to pursue mathematics instead of taking vows to enter the Franciscan order.

Jim commenced his studies at the University of Melbourne in 1959, completing a Bachelor of Arts (Honours) in 1962, a Bachelor of Science (Honours) in 1966, and a Graduate Diploma in Education in 1974. He also completed a Master of Engineering Science at Johns Hopkins University in 1969, and a PhD in Mechanical Engineering at Rice University in 1971.

Jim took up a short-term mathematics lecturing position at the University of Melbourne in 1971. He gained a continuing position in 1977, and was promoted to senior lecturer in 1987. Jim retired from the University of Melbourne in 2002, but remained active as a scholar and taught mathematics at North Shore Coaching College. Jim also undertook consulting work with several colleagues for 25 years, scheduling the match programs for state and national sporting competitions, including the Australian Football League.

Jim wrote wonderful lecture notes, giving students a taste for the historical development of important mathematical ideas, reflecting his deep interest in the history of mathematics. He expended enormous energy in his teaching and his commitment was legendary. He also mentored many new academic staff, providing wise advice on how to teach, manage and coordinate large engineering classes.

Most of Jim's scholarly work was related to the history of mathematics in the United Kingdom and Europe in the first half of the 19th century and in the broader cultural context in which iconic mathematicians from that time worked. Jim's main research interest was the lives of mathematician Johann Peter Gustav Lejeune Dirichlet and his wife Rebecka, the sister of the composer Felix Mendelssohn. Jim's studies were assisted by his excellent command of Latin, Dutch, French, Russian, German, Italian and Hebrew. His remarkable ability in acquiring languages was already manifest in his novitiate years.

Jim will be fondly remembered not only by local colleagues and former students, but by a global network of scholars, with whom he remained in contact. He is survived by his two younger brothers and his wife Emilia.

New Computational Biology and Data Science Courses

The School of Mathematics and Statistics has recently introduced new undergraduate majors in the Bachelor of Science and Master's degrees in the fields of computational biology and data science.

Computational biology is a rapidly growing field at the intersection of biology, mathematics and computer science. Our Computational Biology programs cover the analysis and interpretation of biological phenomena using mathematical and statistical models and state-of-the-art computational tools. These skills are increasingly important in the biological sciences today.

Data science concerns the management and analysis of big data, and sits at the intersection of statistics and computer science. Our Data Science programs cover statistical aspects of data analysis such as data collection, data mining, modelling and inference, as well as principles of computer science such as algorithms, data structures, data management and machine learning. Data Science students learn to manage large and complex collections of data and to gain insights from them, skills which are in high demand in industry, government and research.

Mathematics and Statistics Student Awards

The School of Mathematics and Statistics held its inaugural Student Excellence Awards Ceremony on 25th October in the JH Michell theatre. Drinks and refreshments were held before and after the ceremony. Award winners and their families, as well as staff and alumni, attended the event.

It was wonderful to be able to congratulate our high achieving students, and to hear about the background and history of donors whose support made these prizes and awards possible. The Student Excellence Awards will now become an annual event in the School's calendar.

We congratulate the following students on their excellent achievements:

The Dixson Scholarships (Applied Mathematics)
Kelvin Liu, Lukas Anagnostou and Tim Crowe

The Maurice H. Belz Prizes in Statistics
First Prize: Max Yanchao Yang
Second Prize: Callan Jones

The Dixson Scholarships (Pure Mathematics)
Jayson Liu and Benjamin Metha

The John MacFarland Exhibition
Hui Min Tay

The Stephen Bell Exhibition
Evangelia Dendrinos

The Norma McArthur Prize
Joshua Wakeham

The M.L. Urquhart Third Year Prize
Ned Mahony

The E.R. Love Prize
Jayson Liu

The Professor Maurice H. Belz Scholarships
Patrick He and Anthony Kocoski

The Dwight Prize (Mathematical Statistics)
Damian Pavlyshyn

The Professor Wilson Prize
Lotte Romijn

The Professor Nanson Prize
Naijian (Eric) Shen

The M.L. Urquhart Graduate Prize
Naijian (Eric) Shen

The Wyselaskie Scholarship (Mathematics)
Reuben Van Ammers

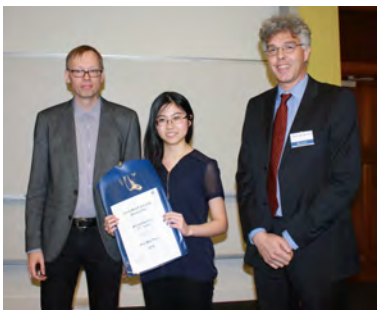

Image: Hui Min Tay receiving her award

Melbourne Integrative Genomics

Recently, population databanks have emerged with whole genome data (millions of measured and imputed genetic variants) and thousands of biomedical measurements in hundreds of thousands of individuals. Detailed molecular measurements of single cells are now becoming routine, and assays to record the functioning of genome regions are rapidly developing. The common theme is large, multilevel datasets that potentially allow us to infer in detail many aspects of the processes that lead from genotype to observed phenotype.

Mathematics and Statistics have contributed enormously to the genomics revolution of the past two decades, and are continuing to contribute as the rapid change continues. Eric Lander, a PhD graduate in algebraic coding theory, has been a leading figure in this advance: founding Director of the Broad Institute of Harvard and MIT and co-chair of the President's Council of Advisors on Science and Technology are two achievements that reflect a stellar career of achievements not in mathematics but in biology and specifically genomics. Australian mathematician Peter Donnelly FRS went from a PhD in stochastic processes to head the Wellcome Trust Centre for Human Genetics in Oxford and a business Genomics plc.

But how can researchers be at the cutting edge of a field that is so dynamic in terms of both understanding and technology, while also keeping up to date with relevant developments in mathematics and statistics, particularly computational algorithms for large datasets? The University of Melbourne's answer is Melbourne Integrative Genomics (MIG), a joint initiative of the Schools of Mathematics & Statistics and of BioSciences.

MIG is located on Royal Parade in the heart of the Parkville Biomedical Precinct, where we engage in innovative genomics research and provide a focal point for collaboration and education. Genomics research is widely dispersed across the STEMM faculties and Parkville's biomedical research institutes, but maths, statistics and computing provide glue that can unite researchers working in different biomedical domains.

MIG focusses on mathematical modelling rooted in evolutionary and population genetics theory, and computational and statistical methods for the analysis of large genomic datasets. We implement and disseminate our work through efficient and user-friendly software, and participate in collaborations from basic biology to clinical practice, including applications in human population history, environmental sciences, animal and crop breeding, forensics and medical research.

To find out more about MIG, visit **research.unimelb.edu.au/integrative-genomics** or contact Director Professor David Balding dbalding@unimelb.edu.au or Research Manager Andrew Siebel a.siebel@unimelb.edu.au.

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